EFFECT OF IDEOMOTOR TRAINING ON SELECTED PSYCHOLOGICAL VARIABLES AND SKILL PERFORMANCE OF BADMINTON PLAYERS

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I hereby declare that the short synopsis **"EFFECT OF IDEOMOTOR TRAINING ON SELECTED PSYCHOLOGICAL VARIABLES AND SKILL PERFORMANCE OF BADMINTON PLAYERS "** being submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in Physical Education under Department of Health Sciences of Lakshmibai National Institute of Physical Education, Gwalior during the academic year 2024- 2025.

It is a bonafide record of original work carried out under the supervision of Dr. Brij Kishore Prasad and has not been submitted in full or part to any other university or institute for a degree or diploma.

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ABSTRACT

Sports mental training, which emphasizes the psychological components that enhance physical skills, has become a crucial component of athletic performance. This field includes a number of methods and approaches intended to improve athletes' mental toughness, concentration, self-assurance, and general psychological health. Ideomotor training improves motor skills and cognitive abilities by taking advantage of the innate connection between thought and movement. Athletes, patients, and people looking to improve their cognitive abilities can all benefit greatly from mental practice and visualization by comprehending and putting the Ideomotor theory's principles into practice. Ideomotor theory and its applications have received empirical support from recent studies. Action-outcome associations can arise spontaneously and impact automatic action selection. Further investigating these mechanisms from a computational standpoint, the effectiveness of Ideomotor processes under particular circumstances. Through mental practice and visualization, Ideomotor Training (IMT) offers substantial advantages in a variety of fields. By mentally practicing movements and visualizing successful outcomes, athletes like badminton players can improve their stroke accuracy and reaction times, improving motor learning and performance without experiencing physical fatigue. This is one area in which IMT is especially beneficial in sports. By visualizing movements, IMT aids patients in physical rehabilitation by strengthening and activating neural pathways related to motor control, which speeds up recovery from neurological disorders or injuries. By strengthening neural connections through mental practice, IMT improves cognitive abilities such as memory, attention, and problem-solving techniques in addition to physical movements.

There is a special emphasis on the mental component of performance because racket sports involve such intense and emotional activity. Ideomotor training and its use in racket sports like badminton have not been extensively studied. This literature gap suggests that more research is necessary to determine how IMT can specifically improve performance and skill development in these sports. For example, research on the psychological and motor skill advantages of IMT for badminton players may offer important new information about how to improve training regimens and sports performance.

Keywords: Mental Training, Ideomotor Training, Psychology, Performance and Racket Sports.

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1. INTRODUCTION

Badminton, a dynamic racquet sport, has gained global popularity for its blend of agility, strategy, and skill. Originating in ancient civilizations, the modern form of badminton emerged in the mid-19th century in British India, drawing inspiration from the traditional games of battledore and shuttlecock. Today, it is played competitively and recreationally worldwide.

Badminton is distinguished by its fast-paced rallies, requiring players to exhibit quick reflexes, endurance, and precise hand-eye coordination. The game is played indoors on a rectangular court divided by a net, with singles or doubles players aiming to score points by hitting a shuttlecock over the net and into the opponent's court. Its accessibility and exhilarating gameplay have made badminton a popular choice for both leisurely activities and competitive sports, fostering a vibrant international community of players and enthusiasts (International Badminton Federation, n.d.).

Mental training in sports has emerged as a pivotal aspect of athletic performance, emphasizing the psychological dimensions that complement physical skills. This discipline encompasses various techniques and strategies designed to enhance athletes' mental resilience, focus, confidence, and overall psychological well-being.

Central to mental training is the practice of visualization and imagery, where athletes mentally rehearse movements, strategies, and scenarios to prepare for competition. By vividly imagining successful outcomes, athletes can enhance their confidence and reduce anxiety, thereby optimizing performance under pressure (Moran, 1996).

Another crucial component is goal setting and mental rehearsal, where athletes set specific, measurable goals and mentally visualize the steps needed to achieve them. This process not only clarifies objectives but also enhances motivation and commitment to training regimens (Locke & Latham, 1990).

Furthermore, techniques such as relaxation training, mindfulness, and cognitive restructuring help athletes manage stress, maintain focus, and overcome setbacks during competition. These practices foster a resilient mindset that is crucial for navigating the highs and lows of competitive sports (Gould, Dieffenbach, & Moffett, 2002).

Ideomotor training stands at the intersection of neuroscience, psychology, and motor learning, predicated on the intriguing premise that mental processes can influence and enhance physical

performance. At its core, Ideomotor training revolves around the concept that mental imagery of movements can activate neural pathways in a manner akin to physical practice, thereby facilitating skill acquisition, rehabilitation, and performance optimization.

The term "Ideomotor" was first introduced by William Benjamin Carpenter in 1852, defining it as the unconscious initiation of movements by mere thought or suggestion (Carpenter, 1852). This foundational idea laid the groundwork for subsequent research exploring the link between mental imagery and motor execution. Over time, Ideomotor training has evolved from its theoretical origins into a practical methodology employed across various disciplines, including rehabilitation, sports psychology, and cognitive neuroscience.

Central to the theory of Ideomotor training is the concept of mental rehearsal. According to motor control theories, mental imagery of movements activates similar neural networks as actual physical execution, including the engagement of mirror neurons and motor cortex areas (Decety, 1996). This process not only enhances motor learning and skill refinement but also aids in the recovery of motor function following neurological injuries such as strokes or spinal cord damage (Jackson et al., 2001).

In the realm of sports psychology, Ideomotor training techniques have been extensively utilized to improve athletes' performance. Research has shown that mental rehearsal can enhance athletes' confidence, concentration, and overall performance quality by mentally rehearsing complex movements and game strategies (Moran, 1996). By visualizing successful outcomes and refining motor skills through mental practice, athletes can achieve peak performance states without the physical wear and tear of repetitive training sessions (Feltz & Landers, 1983).

Moreover, Ideomotor training extends beyond motor skills into cognitive and emotional domains. Studies have demonstrated that mental imagery not only strengthens neural connections associated with motor control but also enhances cognitive functions such as attentional focus and decision-making abilities (Guillot & Collet, 2008). In clinical settings, such as physical therapy and rehabilitation, mental practice techniques derived from Ideomotor principles have proven effective in facilitating motor recovery and improving patients' overall quality of life (Page, Levine, & Leonard, 2005).

Recent advancements in neuroscience have provided empirical support for the mechanisms underlying Ideomotor training. Functional magnetic resonance imaging (fMRI) studies have revealed overlapping patterns of brain activation during imagined and actual movements, indicating a neurophysiological

basis for the effectiveness of mental rehearsal techniques (Porro et al., 1996). These findings underscore the potential of Ideomotor training to not only enhance physical performance but also promote neuroplasticity and recovery in clinical populations.

2. LITERATURE REVIEW

Abalasei B.A. (2017) conducted an experiment on Handball Ideomotor Training and found out that, the practical application of Ideomotor training in a senior handball team showed positive results. Mental training sessions were integrated into the team's preparation, focusing on the mental representation of technical procedures to correct execution errors and enhance performance. The players reported improvements in their confidence, technical execution, and overall performance. The study concludes that mental training, particularly Ideomotor training, is vital for the holistic development of athletes, contributing to their technical, tactical, and psychological readiness for competition.

V.V.Nakhodkin et al. (2019) studied the effect of Ideomotor Training For Competitive Success In Wrestling and concluded that, competitive success of the sport elite is known to heavily depend on the competitive fitness with its components including the individual mental control and conditioning skills, healthy lifestyles, diets etc., with the mental controls playing the key role in the precompetitive trainings. Objective of the study was to analyze benefits of an Ideomotor training model for precompetitive conditioning, fight planning and inspiration in the elite wrestling sport. We used interactive discussions, training process surveys, and adapted Competitive Behaviors Test method for the study purposes, with 20 freestyle wrestlers sampled for the survey. The survey included three questions to rate the following: individual versatility in the wrestling techniques; favored actions within a 15s certain timeframe in extreme competitive situations; and mental control skills and stress tolerance in the extreme competitive situations. The study data gives the grounds to conclude that mental conditioning tools are highly beneficial when the trainings mimic as close as possible the real upcoming bouts, with the fight plans recommended being drafted for every bout albeit reasonably limited in details, with only the key points being specified and trained.

Benesova D. et al. (2020) conducted a study on Ideomotor learning as part of the long-jump technique training in children in the age range of 12-13 years, aimed to determine if Ideomotor training affects the technical performance of the long jump in children. We studied 30 children, aged 12 to 13, participating in athletic training three times a week. They were divided into a control group (n=15) and an

experimental group (n=15), with the latter undergoing Ideomotor training for three months. Both groups had their long-jump techniques evaluated at the start and end of the experiment by two independent experts, who rated the connection of approach run, take-off, flight phase, and landing. The experimental group received 10 minutes of Ideomotor training after each session, focusing on relaxation and imagery phases to create correct movement concepts. Data were analyzed using absolute and relative frequencies, with statistical significance assessed by the Wilcoxon test. Results showed that 80% of the experimental group improved their long-jump technique, 20% showed no change, and none worsened. In the control group, 33.3% improved, 60% remained the same, and 6.7% worsened. The Wilcoxon test confirmed significant improvement in the experimental group compared to a slight improvement in the control group. Our research indicates that Ideomotor training enhances the technical performance of the long jump. We recommend including Ideomotor interventions in athletic training to improve technique by developing speed and movement accuracy.

Smolentseva V.N. (2017) conducted a study on Ideomotor perception to facilitate technical skills mastering process in football, the objective of the study was to evaluate the feasibility and effectiveness of various psychological tools in enhancing the technical skills of junior football players. Conducted at the Irtysh CYORSS in Omsk, the educational experiment involved 9-year-old football players, divided into a Study Group and a Reference Group, each consisting of 13 athletes. Progress was assessed through expert ratings and specialized tests. The experimental training model incorporated psychological tools designed to help the trainees visualize correct techniques and maintain focus on these mental images. This approach aimed to enhance Ideomotor perceptions of ideal technical skills, thereby improving execution quality. The study findings demonstrated that the proposed psychological conditioning model significantly aided the technical skills development of beginner football players. Techniques that helped athletes create and focus on ideal mental images of the techniques were particularly effective, as these Ideomotor perceptions provided valuable guidance and standards for mastering technical elements.

Raj K. et al. (2018) conducted a study on comparative effects of mental and Ideomotor training on "Tai O Toshi" performance in judo, the objective of the present study was to get the influence of mental training and ideo-motor training on "Tai O toshi" performance in Judo. There are ninety male national level judokas from Madhya Pradesh were selected as subjects for this study. The subjects were divided into three groups' i.e. two experimental groups and one control group. Mental training & Ideo-Motor training

was selected as independent variables & “Tai O toshi” performance in Judo was selected as dependent variable. Performance of “Tai O toshi” in Judo was measured by panel of three experts and score was given out of 30 points. The data were collected before the start of the experiment (pre-test) and at the end of the training period (post-test). For the study, pre-test post-test randomized group design, which consists of one control group (n=30) and two experimental groups (n=30 in each) was used. Equal numbers of subjects were assigned randomly to the groups. Two groups (Mental training group and Ideo-motor training group) served as experimental groups on which treatment was assigned and the third group served as the control group. In order to find out the effect of mental training and Ideo-motor training on learning “Tai O toshi” performance in Judo, analysis of Co-Variance (ANCOVA) was used. The level of significance was set at 0.05 level. Both the experimental treatments (Mental Training group & Ideo Motor Training Group) proved to be equally effective in learning “Tai O toshi”. In case of treatments, 84.6 % (Partial Eta Squared = .846) in the total variance can be explained by treatment effect and remaining 15.4 % is unexplained.

Raj K. et al. (2018) conducted a study on comparative effects of mental and Ideomotor training on “O Goshi” performance in judo, the objective of the present study was to get the influence of mental training and ideo-motor training on "O Goshi" performance in Judo. There are ninety male national level judokas from Madhya Pradesh were selected as subjects for this study. The subjects were divided into three groups’ i.e. two experimental groups and one control group. Mental training & Ideo-Motor training was selected as independent variables & "O Goshi" performance in Judo was selected as dependent variable. Performance of "O Goshi” in Judo was measured by panel of three experts and score was given out of 30 points. The data were collected before the start of the experiment (pre-test) and at the end of the training period (post-test). For the study, pre-test post-test randomized group design, which consists of one control group (n=30) and two experimental groups (n=30 in each) was used. Equal numbers of subjects were assigned randomly to the groups. Two groups (Mental training group and Ideo-motor training group) served as experimental groups on which treatment was assigned and the third group served as the control group. In order to find out the effect of mental training and Ideomotor training on learning "O Goshi" performance in Judo, analysis of Co-Variance (ANCOVA) was used. The level of significance was set at 0.05 level. Both the experimental treatments (Mental Training group & Ideo Motor Training Group) proved to be equally effective in learning "O Goshi". In case of treatments, 88.6% (Partial Eta Squared =0.886) in the total variance can be explained by treatment effect and remaining 11.4 % is unexplained.

Martynenko I.V. et al. (2020) conducted a study on the topic" Improvement of technical and tactical skills of 14-16 years old short trackers" the article addresses enhancing the technical and tactical preparedness of qualified short trackers during the competition period by increasing exercises focused on turn passing, employing Ideomotor training, and practicing early acceleration at the finish. It highlights the lack of theoretical and empirical studies on the technical and tactical training of 14–16-year-old short trackers during this period. The pedagogical recommendations and results of technical and tactical preparedness before and after the experiment hold practical significance for managing the training process of athletes, particularly short trackers aged 14–16. The findings aim to boost the training process's efficiency and are of practical value, positively impacting sports results and thereby improving athletic and technical skills.

Atienza et al., (1998) studied how tennis serve performance was affected over a 24-week period by video modelling and imagery training. Tennis players aged 9 to 12 were distributed in three groups: (a) those who practiced physically and received physical training; (b) those who practiced physically and watched a video that included mental training in video modelling; and (c) those who practiced physically and received mental training in both video modelling and imagery. The findings of the intragroup pre-post-test comparisons indicated that physical exercise group's tennis skill did not much increase. The mental training groups improved between the pre- and post-intervention periods. Ultimately, the post-test comparison between the groups showed that, while the latter two did not substantially vary from one another, there were notable variations between the groups that received mental and physical training alone.

Cece V. et al., (2020) conducted a systematic review and found out that, the mental aspect is largely acknowledged by athletes and coaches as a salient factor explaining performance variability. The mental component of performance holds a special place in racket sports considering the inherent demands in such intense and emotional activities. The importance of mental skills in racket sports has been examined within the literature through a bulk of studies highlighting associations between mental skills and a wide range of positive outcomes. Access to the programs which aim to improve the mental skills of the athletes represents a major issue for researchers and the different stakeholders (coaches, athletes, parents). The main objectives of this study were to (a) Collect the studies that incorporate mental training programs used in racket sports, (b) Organize the current knowledge on mental training programs

and provide a synthesis of the characteristics of these studies, and (c) Identify the gaps in the literature on this topic and propose potential further investigations and practical implications. The present systematic review included 27 studies which involved 715 participants. Most of the studies used a quantitative approach and were conducted on tennis. The mental skills developed varied across the studies with domination of imagery and relaxation techniques. Overall, the programs led to positive outcomes on performance indicators (e.g. improvement of service efficacy and stroke quality) and permitted the development of the targeted mental skills (e.g. concentration, motivation). This review highlighted the weak representation of females and novice players within the studies' participants. Moreover, the unequal representation of the techniques and outcomes in the examined studies encourages the development of further mental programs specifically applied to the demands of racket sports and a focus on different mental skills (e.g. emotional intelligence, coach education).

Callow N., et al., (2013) studied the effect of a motivational general-mastery imagery intervention on the sport confidence of high-level badminton players and stated that a multiple-baseline across-participants design was employed to evaluate the impact of a Motivational General-Mastery imagery intervention on the sport confidence of four elite junior badminton players. Sport confidence was measured weekly over a span of 21 weeks, leading up to international and county competitions. The imagery intervention included six sessions (two per week for three weeks) and was implemented using a multiple-baseline approach, with the intervention starting at Weeks 5, 7, 9, and 11 for Participants 1, 2, 3, and 4, respectively. Visual inspection and Binomial tests indicated significant sport confidence increases for Participants 1 and 2, a significant decrease for Participant 3, and a delayed increase for Participant 4. The findings are discussed concerning the effectiveness of mastery imagery and the value of multiple-baseline designs in advancing imagery research.

3. DESCRIPTION OF BROAD AREA

The broad area of this research falls within the field of sports psychology and motor learning, with a specific focus on Ideomotor training and its application in badminton. Ideomotor training, which involves the mental rehearsal of movements without actual physical execution, has gained attention in recent years for its potential to enhance athletic performance through cognitive and psychological mechanisms. This study aims to explore the effectiveness of Ideomotor training in improving the performance of badminton players, while also examining its impact on selected psychological variables

such as concentration, decision-making, critical thinking, self-confidence, and anxiety management. The research seeks to contribute to a more comprehensive understanding of how mental training techniques can complement physical training methods to achieve better overall performance outcomes.

This area of research holds significant relevance for physical education teachers, sports coaches, and sports psychologists, as it introduces a scientifically supported method that can be incorporated into daily training routines. Coaches and educators often emphasize physical drills and technical corrections, but may overlook the psychological and cognitive aspects of performance. By emphasizing the value of Ideomotor training, this study encourages a shift toward more holistic training methodologies that address both physical and mental components of athletic development. The findings of this research will help professionals in the field understand not only the concept of Ideomotor training but also its importance and practical implementation in sports settings. It will enable physical education teachers and coaches to integrate mental rehearsal techniques into their coaching strategies, ultimately leading to better skill acquisition, improved error detection, and refined movement execution.

Furthermore, the research is expected to provide valuable insights for sports psychologists seeking to enhance mental preparedness among athletes. The psychological benefits of Ideomotor training, such as improved focus and reduced performance anxiety, make it a useful tool in designing mental conditioning programs. Badminton, as a sport that requires rapid decision-making and precise motor coordination, provides an ideal context for studying the effects of Ideomotor rehearsal. Through guided mental imagery and rehearsal of specific game situations, players may develop sharper cognitive skills, enabling them to anticipate actions, respond under pressure, and make quicker, more effective decisions during competition.

In addition to its impact on coaches and psychologists, this study aims to benefit the athletes directly by fostering the development of their critical thinking and cognitive abilities. Players will be better equipped to analyse their own performance, understand their mistakes, and make informed decisions both during practice and competition. The ability to mentally simulate game scenarios also provides a valuable opportunity to reinforce correct techniques without the risk of physical fatigue or injury, particularly useful during periods of recovery. Overall, this research aligns with the growing recognition of the role of psychological and cognitive training in sports and aims to establish Ideomotor training as a valid, accessible, and effective approach for enhancing badminton performance and mental readiness.

4. RESEARCH OBJECTIVES

The study's objectives have been established by the problem statement that is the basis for the investigation:

- To examine the effect of Ideomotor training on selected psychological variables of badminton players.
- To examine the effect of Ideomotor training on skill performance of badminton players.

5. RESEARCH METHODOLOGY

5.1. Selection of Variables

The research scholar reviewed the various scientific literatures pertaining to Ideomotor training on selected variables books, journals, periodicals and research papers. Taking into consideration of feasibility criteria availability of instruments and the relevance of the variables of the present study, the following variables were selected.:

Variable-

1. **Independent Variable**
   a. Ideomotor Training
2. **Dependent Variable**
   a. Psychology variables
   b. Skill performance

5.2. Administration of test

A. Psychological Variables – For measuring the psychological variables, different questionnaires will be used and assessed on the given criteria.

B, Skill Performance – For measuring the badminton performance, different standardized test will be used for different skill performance of badminton.

5.3. Research Design

The study will use a genuine experimental pre-test post-test randomized group design as its research methodology. From badminton academy, fifty (N=50) badminton players will be there. Two equal groups (N = 25) of the chosen individuals will be randomly allocated; Group I will receive Ideomotor Training Group (Ideomotor Training Group). Group II will be the reference group (CG). Group I will get Ideomotor training for a duration of 16 weeks, whereas the Control group will practice badminton on a regular basis without receiving any special instruction.

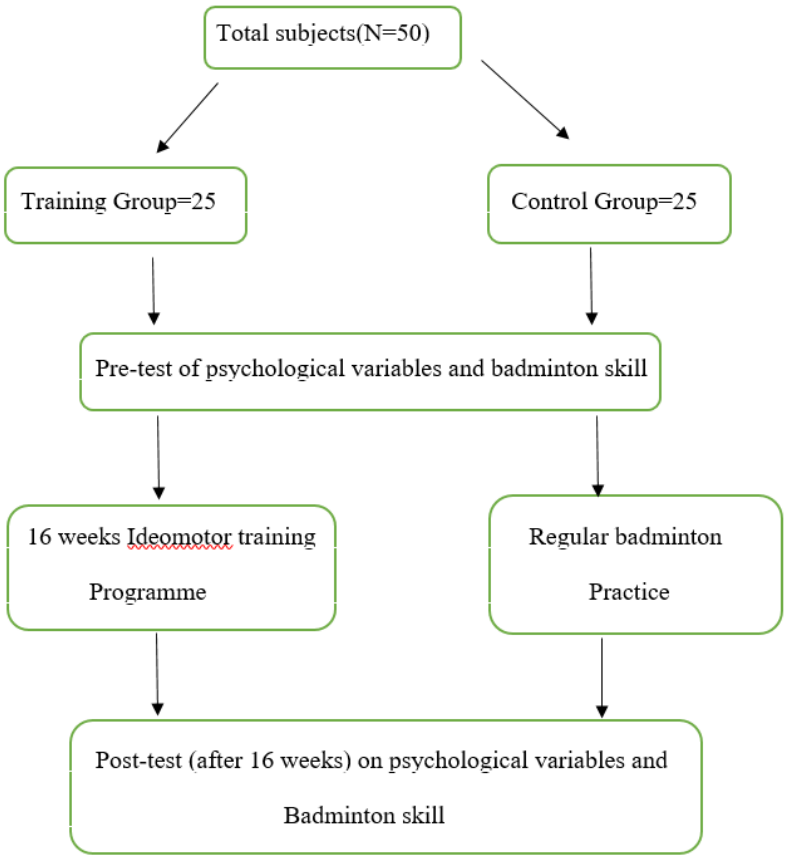
Total subjects(N=50)
Training Group=25
Control Group=25
Pre-test of psychological variables and badminton skill
16 weeks Ideomotor training Programme
Regular badminton Practice
Post-test (after 16 weeks) on psychological variables and Badminton skill

Fig.1: Flowchart of Experiment Design

5.4. Data Sources and Evaluation Methods

Secondary Data Sources: It will be taken up from the different research papers and peer-reviewed journals on mental training, Ideomotor training, visual mental training, psychology and performance.

Primary Data Sources: It will be generated by conducting a research in which 16 weeks' intervention will be given to the experimental group.

Evaluation Methods: The analysis and interpretation of the data will be divided into two different sections. The first section will include assumptions to meet the statistical analysis for using parametric tests. A normality and homogeneity tests will be used to gain a clear picture of the collected data, for that Shapiro-Wilk Test and Levene's Test was conducted. In the second section, a descriptive statistics and t-test will be used to determine the effect of the intervention on both the groups and level of significance will be set at 0.05.

6. EXPECTED OUTCOME

This study aims to examine the effect of Ideomotor training on the performance of badminton players and its influence on selected psychological variables. It is hypothesized that implementing Ideomotor training, which involves mental rehearsal of movements without physical execution, will significantly enhance players' on-court performance. Additionally, the training is expected to lead to noticeable improvements in psychological factors. By integrating this form of cognitive training into their regular practice routines, athletes may experience both physical and mental benefits. The findings may contribute to the development of more effective, holistic training strategies in competitive badminton.

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